

REVIEW ON IMAGE SEGMENTATION TECHNIQUES WITH NORMALIZED CUTS

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ABSTRACT

Image segmentation is the vital part to splits the digital image into multiple parts or segments. The various segmentation techniques are used in the image segmentation for analyze the image or to change the representation of an image. In this paper, we discuss the some vital and simple segmentation techniques that these techniques are widely used. The image segmentation techniques are widely applying the content based image retrieval, medical imaging, object detection, machine vision, face detection, iris recognition etc. Normalization cuts are the main drawback of image segmentation and using the normalization algorithms to overcome this drawback.

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INTRODUCTION

The image segmentation concept is widely used in the image processing. There are so many kinds of techniques are available in image segmentation. These are all techniques are used by researchers. Based on the color, the image can be dividing in to two kinds, are (i) Gray Scale Image, and (ii) Color Image.

The gray scale image means, shades of gray varying between black and white and its values between 0 to 256, for 8-bits color. (i.e.,) the transition between pure black or pure white. It measures only intensity. Fig 1 represents the segmentation of gray scale image.

The color image is fully color information for each and every pixels, it has three Channels (values), and its measure the Intensity and chrominance of light.

The image segmentation techniques are widely applying the content based image retrieval, medical imaging, object detection, machine vision, face detection, iris recognition, finger print recognition, face recognition.

The using of the segmentation techniques are wholly different, based on the kind of image. The edge based, region based, model based and threshold based techniques are discussed here. And Fig 2 represents the segmentation of gray scale image.

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Figure – 1: *Segmentation of Color Grayscale image***Figure – 2:** *Segmentation of Color Image*

RELATED WORK

Nikita Sharma, Mahendra Mishra, Manish Shrivastava^[1] proposed a new image segmentation methods are region based and edge based segmentation. Muhammed Waseem Khan^[2] proposed a six types of segmentation techniques and we are referred Threshold and region based method.^[3] In this paper analyze the following kind of methods such as edge, region, model and threshold segmentation methods. “Biased normalized cuts” declared in this paper^[4], we analyze image resolution and it is used. we analyze the graphical method in this paper^[5] and it is used to minimize the normalized cuts. M.Y. Choong, C.F. Liao, J. Mountstephens, M.S. Arifianto, and K.T.K. Teo^[6] that paper defined an alternative approaches for normalized cuts to used to segments the images part by part individually.^[7] in this paper referred fundamentals of image processing.

IMAGE SEGMENTATION TECHNIQUES

3.1 Edge Based Segmentation

In the edge based segmentation can be used to split the image on its edge such as object edges. ‘Edge detection’ is the vital point using the digital image processing. The edge detection widely used by many application such as computer vision, object detection etc. Under the edge detection, there are so many kinds of algorithms and techniques are used. The edge detection is mainly used for, any abrupt changes occurs in the image including brightness or intensity, where it occurs that to be try to identify these abrupt changes. There are various algorithm are used under the edge detection to be performed efficiently. The widely used two vital methods are given here.

3.1.1 Gray Histogram Technique

In the gray histogram technique, the foreground is spitted from the background, using threshold value. When select the threshold value, there are so many difficulties are arise, by means of presence of noise. Thus use the threshold value in the intersection between the object and background.

3.1.2 Gradient Based Method

In the gradient based method, that is used to identify any abrupt changes in the near edge. The gradient method using various kinds of operator like canny operator, Laplacian of Gaussian (LOG) . Therefore, the edge detection algorithms is mainly focus on detect the edge, and if any noise may occurs, to identify and reduce these noise in the efficient way. When detect the noise, and reduce the form of fake edges creation.

3.2 Region Based Segmentation

The region based segmentation is completed opposite of edge based segmentation techniques. In the region based segmentation technique, the images are splits based on its regions. The region based segmentation using the set of certain criteria, following below.

3.2.1 Region growing

In the region growing method based on the similar properties such as intensity, color that the collection of pixels is form the region. The main step in the region method , to select the collection of seed pixels that are its mainly resemble to its properties. Growing means the regions are adding the each and every seed, this neighbouring particle to be compare of the predefined properties. The region is growing, until the match is not found on the region.

3.2.2 Region Splitting and Merging

In the split and merging region method is used to divide the image into unique regions. Then regions are merged, if it is similar to give larger irregular regions.

3.3 Model Based Segmentation

The model based segmentation is used for only, if the image has the exactly shape of image objects.

3.4 Thresholding Method

The thresholding method is a simple method used for many simple applications. The two kinds of thresholds are available. Local thresholding and global thresholding. The global thresholding is chose the one value from the whole image, but local thresholding is chose the different values from the different regions.

NORMALIZATION CUTS IN IMAGE CELLS

To overcome the image segmentation problems using normalized cuts algorithm. Pseudo code of normalized cuts in two stages in two stages, that can be declared first stage and second stage segmentations. That process is input is color/gray scale images, to read the image, then to construct (mxn) pixels and there is less than threshold value , it can be proceed to local normalized cuts segmentation. Otherwise compute background node in nthcells. Finally segmented segments and to display the result. Normalization cuts is drawbacks of segmentations. Fig 3 different kind of (m × n) image resolutions. Z matrix with a size of (m × n) × (m × n). For example, an image with a size of 100 × 70 will end up computing a 10800 × 10800 adjacency matrix, which is considered a very large matrix for a computer to solve for eigen values, that segmented done by hierarchical manner. For

example original resolution image in 240×320 that can be splits into various resolutions in Fig 4.

Figure – 3: Image Resolution

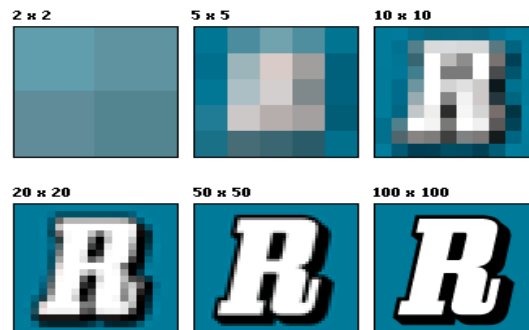
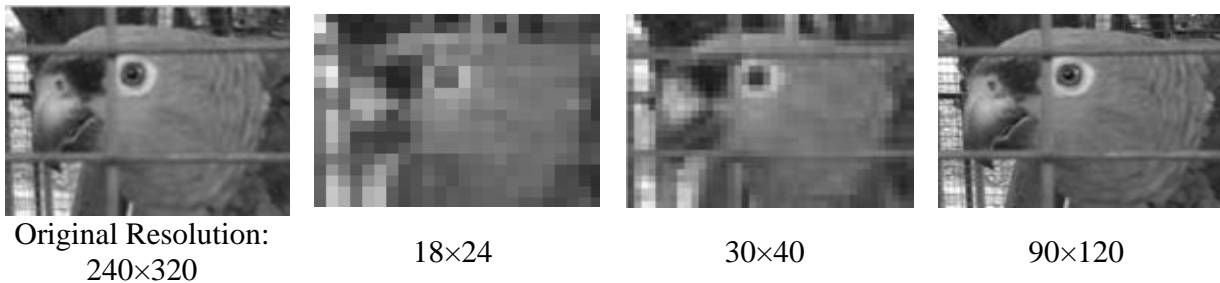


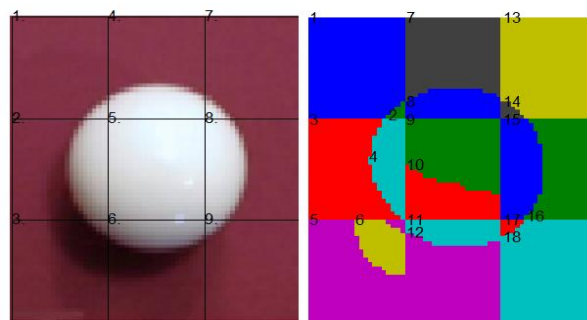
Figure – 4: Image at Different Resolution



4.1 Segments Merging and Image Cells

To reduce processing such large matrix, it can be defined high resolution images are divided into equal size. To check the image cells in preliminary stage and that can be look like unevenly or irregular pixels to apply normalization cuts algorithm. Fig 5 declares the (3×3) segmentation on image cells individually.

Figure – 5: 3×3 Image Cells and its Segmentation on the Image Cells Individually



For example Fig 6 to describe the image in segment 1 and segment 2. Input image (300×400) that segment into 6×6 image cells.

4.2 First Stage Segmentation

The first stage of segmentation is providing the n_1 number of segments, normalized cuts algorithm is then performed to segment out n_1 number of clusters to implemented normalized cuts algorithm in particular cell. In this segmentation stage, to reduce

discrimination power on the whole image. Each and every image cell, the implementation of simple k-means clustering is most important part of number of segments. That can be defined by Fig 7.

Figure – 6: 6x6 Image Cell and Segmentation Result

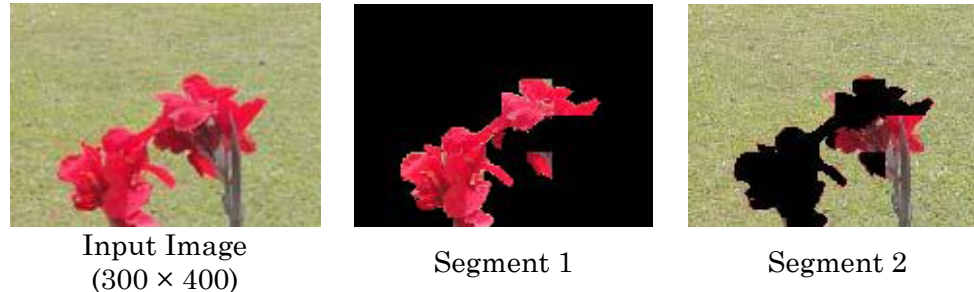
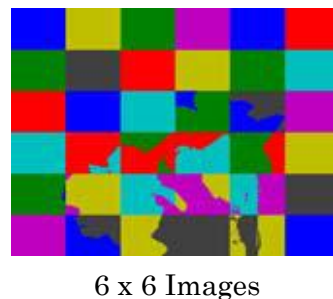


Figure – 7: First Stage Segmentation



6 x 6 Images

4.3 Second Stage Segmentation

That segmentation stage computed simple representations of the segments, to calculating the median value of the segment and computed nodes are act as pixels in that stage. The values are threshold , s and distance of the pixels. Finally to apply the normalized cut algorithm, then segments are labeled then nodes computation after second stage segmentation.

CONCLUSION

There are various techniques are available in the image segmentation of the image processing. In the above, we gives the some simple and efficient techniques for image segmentation. The various image segmentation techniques developed and being developed the using of unique approaches and algorithms. These are techniques are used to evaluate the images in the efficient way.

REFERENCES

- [1] Sharma, N., Mishra, M., & Shrivastava, M., (2012) “Colour Image Segmentation Techniques and Issues: An Approach”, *International Journal of Scientific & Technology Research*, 1 (4), 9 – 12.
- [2] Khan, M. W., (20,14) “A Survey: Image Segmentation Techniques”, *International Journal of Future Computer and Communication*, 3 (2), 89 – 93. DOI: [10.7763/IJFCC.2014.V3.274](https://doi.org/10.7763/IJFCC.2014.V3.274).

- [3] Kandwal, R., Kumar, A., & Bhargava, S., (2014) “Review: Existing Image Segmentation Techniques”, *International Journal of Advanced Research in Computer Science and Software Engineering*, 4 (4), 153 – 156.
- [4] Maji, S., Vishnoi, N. K., & Malik, J., (2011) “*Biased Normalized Cuts*”, IEEE Conference on Computer Vision and Pattern Recognition(CVPR), 2011, 2057 – 2064.
- [5] Shi, J., & Malik, J., (2000) “*Normalized Cuts and Image Segmentation*”, IEEE Transactions on Pattern Analysis and Machine Intelligence, 22 (8), 888 - 905. DOI: [10.1109/34.86868](https://doi.org/10.1109/34.86868).
- [6] Choong, M. Y., Liau, C. F., Mountstephens, J., Arifianto, M. S., & Teo, K. T. K., (2012) “Multistage Image Clustering and Segmentation with Normalized Cuts”, 3rd International Conference on Intelligent Systems, Modeling and Simulation (ISMS), 362 – 367. DOI: [10.1109/ISMS.2012.112](https://doi.org/10.1109/ISMS.2012.112).
- [7] Petrou, M., & Petrou, C., (2010) “*Image Processing: The Fundamentals*”, John Wiley & Sons.